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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,830	10/31/2003	Rahmi Hezar	TI-36449	1283
23494	7590	12/27/2004	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265				LAUTURE, JOSEPH J
ART UNIT		PAPER NUMBER		

2819

DATE MAILED: 12/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/698,830	HEZAR ET AL.	
	Examiner	Art Unit	
	Joseph Lauture	2819	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 05 October 2004.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-14, 18-21, 23 and 24 is/are rejected.
- 7) Claim(s) 15-17 and 22 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 31 October 2003 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
	6) <input type="checkbox"/> Other: _____.

Response to Amendments

Applicant's amendment filed on 10/05/2004 has been entered. As a result, all 35 U.S.C 112 rejections have been overcome.

Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-14,18-21, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Galton et al (US 6,697,004 B1) in view of Chen (US 6,710,729) and Ruha et al (6,473,019).

Regarding claims 1-5, 12-14 and 18-21, Galton et al teach in figure (7) a second order analog-to-digital conversion system (700) comprising a delta-sigma modulator (604) that includes: a first flash analog-to-digital converter (710) providing a thermometer coded first digital output (See column 6, lines 5-8) according to a system analog input and according to a noise-shaped first analog feedback signal (See column 1, lines 25-28);

a noise-shaping system having N modulator/integrator amplifiers (704), (708), the noise-shaping system (712) (shown in figure 5) being coupled to the first analog-to-digital converter (710) and providing the first analog feedback

according to the first digital output, the first analog feedback signal being noise-shaped by the noise-shaping system (712) to an order N with respect to a quantization error associated with the first analog-to-digital converter; a digital decimation filter (714) coupled to the output of the converter (710), and providing a multi-bit digital output representative of the analog input.

Claims 6-14, 18-21,23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Galton et al (US 6,697,004 B1) in view of Chen (US 6,710,729) and Ruha et al (6,473,019).

Regarding those claims, Galton et al teach the essential features of the claimed invention as set forth above except for multiple feedback loops feeding an output signal to a subtractor that provides an analog difference to be re-digitized. However, Chen teaches in figures (2) and (3) a delta-sigma converter with noise-shaping circuitry, the converter including a first DAC (342) coupled with a first A/D converter (316), the first DAC providing an analog output which is then subtracted from the system analog input; a first and second feedback loops that provide an analog feedback signal to the first converter, the feedback signals being noise-shaped. The system of Chen further discloses a first integrator (308) coupled to the first DAC (342), a second A/D converter/quantizer (236) (shown in figure (2)) coupled to the first integrator and providing a second digital output based on the output of the integrator, a second DAC (344) (shown in figure (3)) coupled to the second converter/quantizer and providing feedback to the first integrator, wherein the integrator output is noise-shaped, and delay elements (318), (320) and (332) providing an analog delayed output. Therefore, it would

have been obvious to one skilled in the art to incorporate the teachings of Chen into the system of Galton et al to improve system performance and reliability because this would reduce idle channel tones without high hardware costs (See column 2, lines 10-12).

Regarding claim 24, Chen teaches a second order noise-shaping system for providing a noise-shaped analog feedback to an A/D converter in an analog-to-digital conversion system, the noise-shaping system comprising a first order integrator (308) having a single amplifier; and a plurality of feedback loops providing analog feedback signals to an A/D converter (316) with second order noise-shaping with respect to a quantization error. Chen does not specifically disclose a Digital Signal Processing circuit in a feedback loop. However, the use of such circuits to control such operations as switched capacitor and Dynamic Element Matching among other error reduction techniques are known in the art, as exemplified by Ruha et al. Ruha et al teach in figure (9) a sigma-delta modulator that includes a logic circuit (23A), (23B) and (23C) in each of three feedback paths to control operations of DACs (24). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate a logic circuit of the kind used by Ruha et al into the feedback loops of the system of Chen to further attenuate errors because that would yield a reduced generation of kickback noise (See column 1, lines 51-53). It would have been further obvious to include in the converter system a technique for reducing the number of comparators in a noise shaping system because such

techniques are known in the art, as acknowledged in the "Background of the Invention" (See page 3, lines 25-28).

Allowable Subject Matter

Claim 15-17 and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Art Unit: 2819

CONTACT INFORMATION

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Lauture, whose telephone number is (571) 272-1805. The examiner can normally be reached Monday to Friday between 9:30 am and 6:00 PM

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Tokar can be reached at (571) 272-1812. The fax number for the organization to which this application is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist whose telephone number is (571) 272-1562.

Joseph Lauture
Art Unit: 2819
Date: 12/16/04

Peguy Jean Pierre
PEGUY JEANPIERRE
PRIMARY EXAMINER